COUNTING
COLLATING
COMPUTING

AN EXHIBITION OF COMPUTING OLD AND NEW

From the collections of
Prof A.H.J. Sale, University of Tasmania
The Tasmanian Museum and Art Gallery

Sponsored by
The Department of Science and Technology
The Australian Computer Society, Inc.

Exhibition Dates
The Tasmanian Museum and Art Gallery, Hobart
18 August — 6 September 1981
The Queen Victoria Museum, Launceston
15 September — 4 October 1981

Material on display in this exhibition was donated by
Burroughs
C.S.I.R.O.
International Business Machines
International Computers Limited
Olivetti
The Elizabeth Computer Centre
The Transport Commission
The University of Tasmania

Information Technology Week is an annual event designed to focus the attention of the Australian community on computers and communication technology and their role in our future, so that by making information accessible we may be better prepared for future decisions. This exhibition was organized by the Tasmanian Information Technology Week Committee to show an historical perspective of technological change.

INFORMATION TECHNOLOGY

The ability to handle information is one of the major attributes that sets Man off from the rest of the animal kingdom; not surprisingly technology has been used to assist in the processing of information from the beginnings of recorded history.

Some of the best-known of these technological artefacts are the devices invented to facilitate counting, and later in calculating. Once numbers were recognized as a universal currency for measuring quantity, the world saw the invention of counting-frames, the abacus, the Chinese suan-phan, pencil and paper calculation methods, Napier's bones, logarithm books, slide-rules, nomograms, and today the pocket electronic calculator. The role of arithmetic in common life and in leading up to computers is important, and well-represented in this exhibition, but it is not even the most important feature of the modern computer.

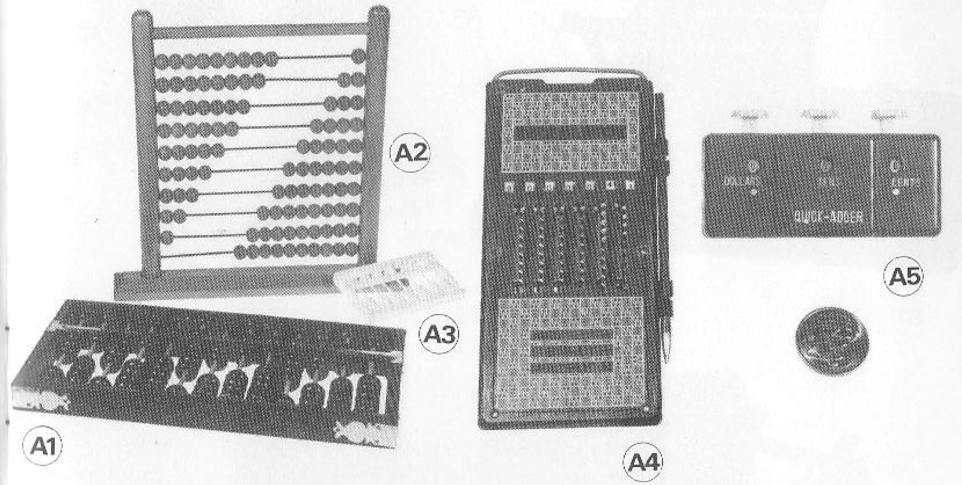
Even more vital is the ability to store information, be it numbers or names, and techniques for storing data can also be traced back in time. Early forms of writing are information technology, whether Egyptian heiroglyphics or copperplate handwriting of the Victorian era, as are the methods used to receive the writing — stone, wax tablets, clay, papyrus, paper, etc. A change in technology was needed when it first became necessary for machines to receive recorded information without a human intermediary, and this is conventionally dated to the Jacquard loom where weaving instructions were coded into holes in a set of linked cards. The Jacquard loom led to Charles Babbage's heroic efforts in the mid-1800s to construct a mechanical
1890 computer, thence to the use of punched cards in the US 1980 Census, and then rapidly through early punched card data processing installations to modern computers, and their highly sophisticated storage devices which employ almost anything that physicists can think of or engineers can build.

The representation of information is equally important in this storage, for any information only *represents* something else — it cannot *be* it. In the study of information science representation ranges from simple things like the Morse code and the arabic numeral system, to complex error-correction codes used to receive weak signals from spacecraft in the outer reaches of the solar system and the description of complex tasks to be carried out by machines.

Of course, the description of tasks is a part of computing technology embraced by the term 'artificial languages'. Such artificial languages also predate modern computers, and can be seen still in cooking recipes, knitting patterns, and many other process descriptions. With the invention of the computer, this aspect of information science took a major boost, and today there are many hundreds of such artificial languages for special uses.

THE SUPPORTING TECHNOLOGY

Once computers became of economic interest, engineers and physicists found that a great deal of skill could be put into supporting the information-processing and information-storing structures that were wanted. Computers have been proposed (and some built) that worked on rotating machinery, on fluid jets in pipes, on electromagnetic solenoids, on electron flow through a vacuum, on magnetic hysteresis effects, and many other principles. As most people now know, modern electronic computers are built around the transistor constructed on a chip of silicon. The technology of computing devices is of interest in its own right, as well as its role of supporting information-handling purposes.



A1 Suan-Phan (1969)

Black wooden (2,5) abacus
290 x 140 x 25

The Suan-phan or Chinese abacus is still used for calculation. The central bar separates beads having a 'weight' of 5 from those having a 'weight' of 1 (similar to Roman numerals). A total of 1+4 beads per bar is sufficient for decimal arithmetic, but the Chinese version acquired two additional beads during its life.

A2 Child's abacus (1940)

Upright wooden (10) abacus with faded coloured wooden beads on wire.
270 x 50 x 270

Probably made around 1940, this child's abacus has a simple representation of each decimal digit to facilitate learning. Russian abaci used this scheme as well, but have now vanished.

A3 Pocket Suan-phan (1969)

Small ivory (2,5) Abacus
100 x 60 x 10

The sharp edges of the beads on this pocket abacus are more typical of both Chinese and Japanese abaci, since they allow rapid, accurate movement of the beads by the fingers. Purchased in Mauritius, 1969.

A4 Magic Brain calculator (1965)

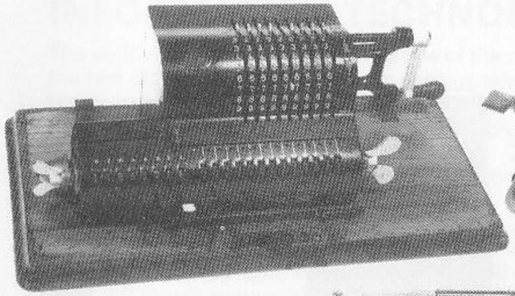
Metal pocket calculator with slots and brass operating rod
70 x 150

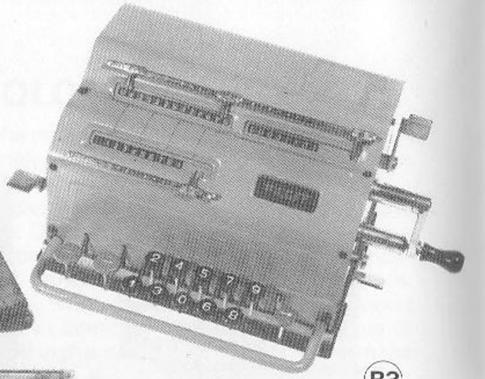
This low cost calculator is operated by inserting the brass rod in a slot and moving the slides up or down. A very primitive mechanism, but effective; dexterity and practice were necessary to use it well.

A5 Shopping calculator (1965)

Red plastic adder with three buttons, model No. 6319
Made in Hong Kong
95 x 20 x 50

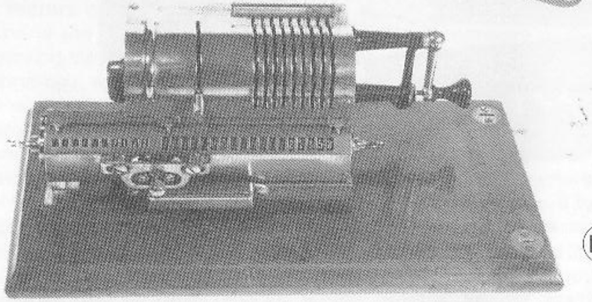
These simple adders (subtraction is impossible) were very popular when supermarket shopping was introduced; in the late '60s clicking was a common sound in these shops as buyers kept track of their purchases. Acceptance of supermarkets led to their demise, although they can still be purchased. The limiting sum of $19.99 means they are not very useful today.





B3

B1



B2

B1 Brunsviga manual calculator (1895)

Black calculator on varnished wooden base, serial No. 661
410 x 200 x 160

This is possibly the oldest manual calculator of its kind in Australia. Its serial number of 661 in the Brunsviga production series dates it to around 1895. This machine was acquired by Professor A.H.J. Sale in 1967, from flood-damaged stores at the University of Natal; previously it had been owned by the South African Defence Forces. It is still in perfect operational order.

B2 Brittanic manual calculator (1930)

Brass calculator on varnished wooden base, serial No. 2503
Made in England by Guy's Calculating Machine Ltd, Wood Green, London N22
350 x 180 x 140

This manual calculator is typical of machines produced in the years between 1900 and 1940. Even a small calculator such as this has hundreds of parts, and was expensive. This machine was used in the University of Tasmania's Physics Department.

B3 Facit manual calculator (1950)

Grey enamel calculator, serial No. 165484
300 x 200 x 150

These machines were mass-produced in the 1930-1960 period, and were the mainstay of many scientific projects. The Facit calculator was probably the best known of these, though Brunsviga remained very popular. People were employed to operate these machines for lengthy scientific calculations, and were called 'computers'. The term dropped into disuse about 1955 with the invention of the 'electronic computer', so-called to distinguish it from the human variety. This machine was acquired from the Mathematics Department of the University of Tasmania, where it was part of a calculating laboratory many years ago.

C1

C2

C1 Remington Contex X-30 electric calculator

Grey plastic electric calculator, serial No. 473048092
Made by BRDR CARLSEN A/S, Gentofte, Sweden
200 x 270 x 120

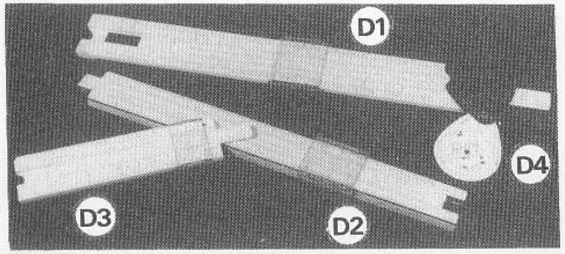
This machine is typical of the small electric calculator before modern electronics made them obsolete. Driven by an electric motor, the principles are still the same as the hand-operated calculators. This calculator was donated in 1980.

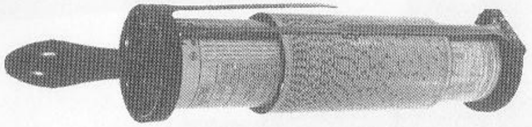
C2 National printing electric calculator

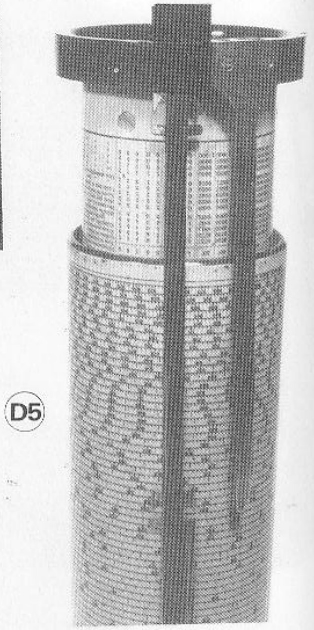
Metal calculator with printing mechanism
250 x 140 x 140

This electric calculator is intended for use in accounting applications (not scientific ones), as can be seen by the following features:

- the printing mechanism for recording purposes,
- the keyboard, with provision for shillings and pence (note keys for 10d and 11d), and
- credit/debit and sub-total facilities.







D1 Aristo Slide-rule (1975)

10-inch white plastic slide-rule, model No. 0968
Made by Aristo, Germany
340 x 50

This slide-rule is functionally identical to the much larger demonstration slide-rule also in this exhibition. Manufactured in quantity to low prices for school and university students, such slide-rules were capable of accuracy to three decimal digits (0.1%).

D2 Engineer's slide-rule (1959)

10-inch wooden slide-rule with white plastic facing, No. 765
Made by Faber-Castell, Darmstadt, Germany
300 x 40

Slide-rules were made with many auxiliary scales besides the main C and D scales for multiplying and dividing. This model, purchased in 1959, is intended for electrical engineering calculations. The plastic-on-wood construction was considered more stable and accurate than plastic-only construction, and persisted until the slide-rule industry collapsed due to the falling prices of electronic calculators. This design was the work of Professor Walther of the Technical University of Darmstadt.

D3 Pocket slide-rule (1963)

5-inch white plastic slide-rule, model ELECTRO 611U
Made by UTO, Denmark
150 x 40

Slide-rules of this kind were manufactured for convenience, and were capable of about 0.5% accuracy. This rule was purchased in 1963.

D4 Pocket circular slide-rule (1974)

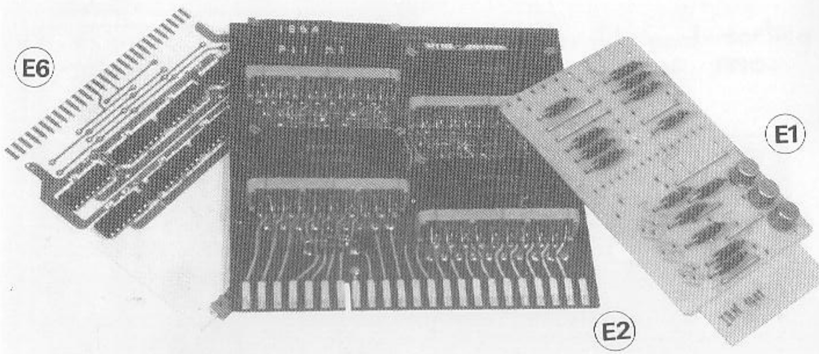
White plastic circular slide-rule in brown case, model No. 32
Made by Concise Circular Slide Rule Co Ltd, Edogawaku, Tokyo
60 dia

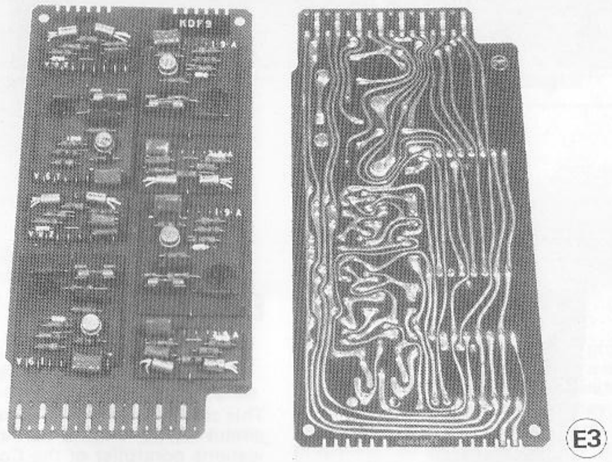
This highly portable slide-rule is capable of about 1% accuracy; enough for estimating purposes. It also contains scales for a perpetual calendar. This rule was purchased (new) as late as 1974; such a late survival is attributable to the very low cost.

D5 Fullers cylindrical slide-rule (1920)

Cylindrical rule in wooden construction; wooden case, serial No 10334
Made by Stanley, England
From the collection of the Tasmanian Museum
500 x 140 x 140

Probably circa 1920, this rule is to Professor Fuller's (Queen's University of Belfast) patent design. The wrapping of the scales around the cylinder allows the effect of a 41 foot rule to be packaged into this size. An accuracy of four decimal digits (0.01%) was achievable by this means. A second model of this rule (with bakelite handle) is also preserved in Professor A.H.J. Sale's collection.





E1 IBM 1401 circuit card

Printed circuit card, type 491149
65 x 115

A logic circuit card from an IBM 1401. Computers of this era are composed of large numbers of identical logic cards, and relatively few special electronics cards. Wiring on the back of the sockets (the 'backplane wiring') is complex. This example is from a Sydney University machine taken out of service in 1974.

E2 P.I.I. computer logic card (1963)

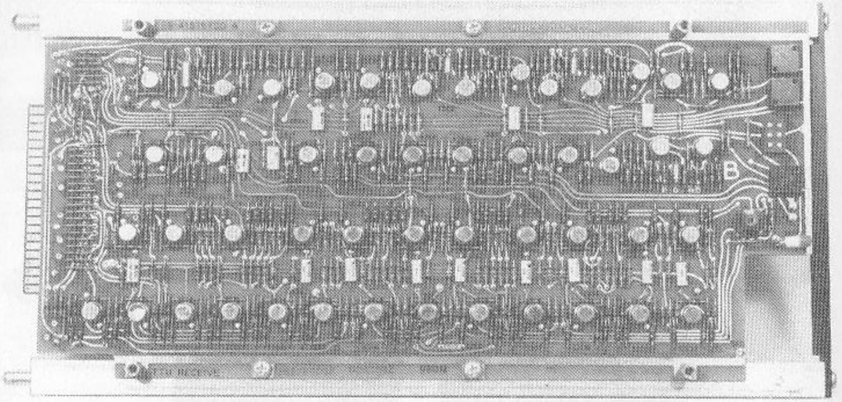
Printed circuit card
120 x 120

Designed and built at Philips NV factories in the Netherlands, this is a card for an experimental computer designed by Professor A.H.J. Sale in 1963/4. It contains eight logic 'gates' capable of making primitive logical decisions in about 1 millionth of a second. The Philips International Institute computer operated reliably until 1978, which is a remarkably long life for a computer. It was an early example of what is now called a 'mini-computer'.

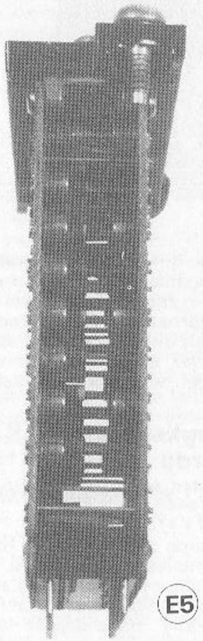
E3 English Electric KDF9 logic cards

Printed circuit boards, types 8310558 & 8314468/E
220 x 110

These boards are interesting for their use of sub-assemblies on the card, and for the exceptionally exquisite meanders of the printed circuit connexions seen on the back. They were clearly hand-drawn by a master draughtsman.



(E4)



(E5)

E4 Control Data 1700 logic card (1968)

Double layer printed circuit card, types SS 41516700A & SS 41516400A
380 x 180 x 35

This card represents the apex of complexity of circuit cards. This is part of the communications controller of the Control Data 1700 installed in Sydney University 1968-78.

E5 Control Data 1700 logic board (1968)

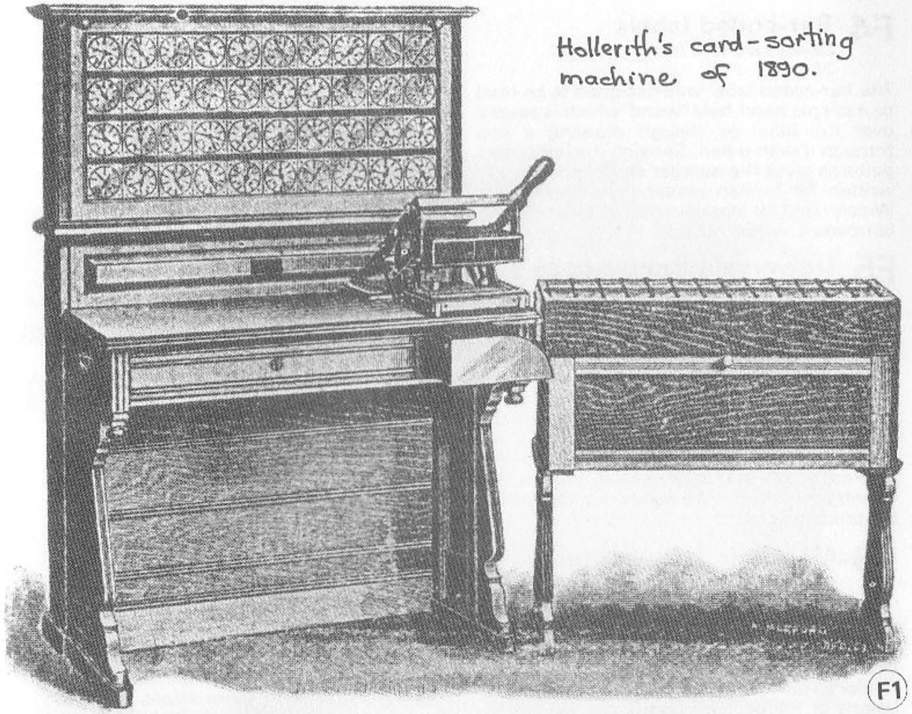
Two layer printed circuit board, type BYKTT
80 x 90 x 30

A repairman's nightmare! The complex construction gave very short wire lengths and consequent high speed of switching (about 1/10,000,000 second).

E6 NCR logic board

Printed circuit board with chips, type 315-01512274/5
100 x 100

This card shows the intrusion of 'chips' into computers; in this case low-density logic chips mounted on a card similar to the others shown.



Hollerith's card-sorting machine of 1890.

(F1)

F1 Punched cards

Buff cards with array of 80 x 12 rectangular holes
Printed in Australia by Computer Resources Co
190 x 80

Invented by Dr Hollerith for the United States 1890 census, punched cards have long dominated the computer field as a method of preparing machine-readable data. They are now obsolescent, but can still be found in use. One character is coded into each 'column'; any printing on the top edge of the card is done when the card is punched or by a machine called an 'interpreter' to make it possible for people to read the information too. There are 80 columns on such a card. The age of the design is witnessed by the rectangular hole shape — surely one of the most impractical shapes to have chosen!

F2 Mark-sense cards

Buff rectangular card
Printed in Australia by Computer Resources Co
190 x80

Mark-sense cards were an out-growth of the punched card, but allow information to be encoded by filling in 'boxes' with a soft 2B pencil (or sometimes a pen). They were often used where small amounts of data were prepared, as by salesmen in the field or factory floor supervisors, or where low cost preparation was important, as in early schools computing or multiple-choice examinations. They are now obsolescent, both because better methods of data entry have superseded them and because marks on paper forms can also be read.

F3 Punched paper tape

Roll of punched paper tape
25 width

Popular in Europe and for cheap computers, data is recorded in the holes punched across the width of the tape. Both 5-hole and 8-hole tapes are used. Tape readers are capable of reading at rates up to 1000 characters/sec, and the material is cheap. However, it is impossible to change information punched into a tape and corrections require making a fresh modified copy. Punched tapes are still used for telex machines, for cheap recording devices, and in a few other areas.

F4 Bar-coded labels

Library card with label
25 x 10

The bar-coded label was designed to be read by a simple hand-held 'wand' which is passed over the label as though drawing a line through it with a pen. Sensing the light/dark patterns gives the number stored and usually written for human readability on the label. Widely used for identification of library books, borrowers cards, etc.

F5 Universal product code labels

Packaging with UPC labels
30 x 25

The UPC label is an extension of the bar-code system which caters for automatic scanning. In some large supermarkets the scanner is mounted under a glass-topped checkout counter and can read the label on goods simply slid across the counter. The codes are internationally standardized and include the country of origin of the goods (hence universal product code).

F6 Magnetic striped credit cards

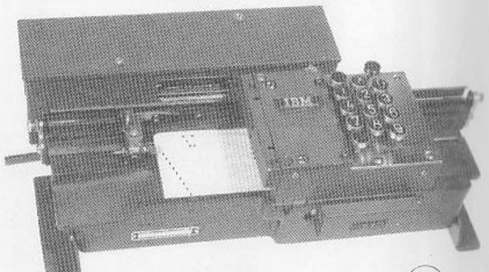
Plastic credit card
85 x 55

Note the magnetic coating stripe on the back of this card. This may be used to encode the holder's name and account number, and details of the account status, for reading by cash-issuing or similar machines. The size, layout, and number assignment on credit cards is internationally standardized to permit common use of magnetic stripe reading, and of optical character reading of the embossed characters. A country-code is often incorporated.

F7 Card Gauge

Aluminium sheet with edge guides
Made by International Computers & Tabulators (ICT), UK
200 x 100

Gauges such as this were and are used to check that the punch mechanisms keep their critical alignment. Placing a punched card over the gauge will indicate holes out of alignment by showing silver background through the hole. Correct hole alignment and card size are vital to the trouble-free operation of card equipment. Computer rooms are humidity-controlled mainly to prevent swelling of punched cards in thickness and consequent card jams in the interior of equipment. A typical reader could operate up to 1000 cards/min; cards might travel at 200 km/hr through the guides. A jam usually resulted in the destruction of some cards, which had to be replaced.



F8

F8 IBM card punch (1970)

Grey enamelled steel machine with cord
500 x 260 x 150

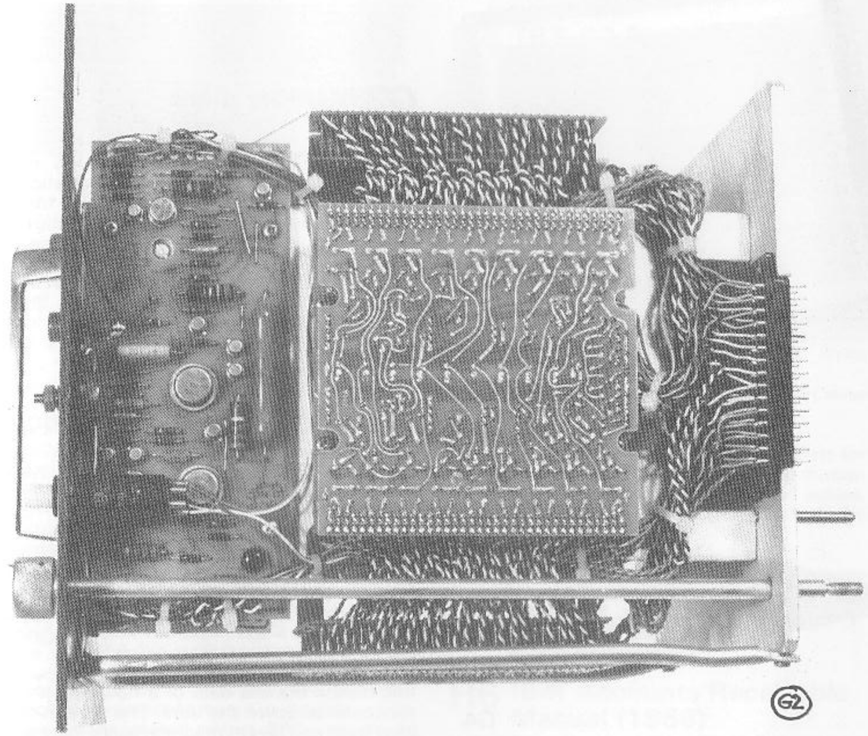
Card punches such as these were used in computer rooms to make minor changes in 'punched cards', or to prepare replacements for cards destroyed by a machine malfunction (commonly known as a 'card jam'). This machine was in use in the Transport Commission, Hobart, until December 1980.

A card would be inserted on the bed and loaded under the 'punch station'; pressing keys causes the electric solenoids to punch the rectangular holes. (Many newly married computer programmers have cause to regret the sharp corners of the chads thus produced, which were often used as confetti.) The low cost of the machine obviated the need to install an expensive card punch in the computer room for very occasional use.

F9 IBM paper tape punch (1970)

Grey enamelled machine on roughly triangular base
180 x 210 x 60

Small punches such as this were used in computer rooms to manually prepare short sections of punched paper tape. Such short sections were joined to make an endless loop and inserted into high-speed printers so as to mark the top of a page, or a pre-determined printing line (a printer 'control tape').



G2

G1 Read Head for disk drive (1980)

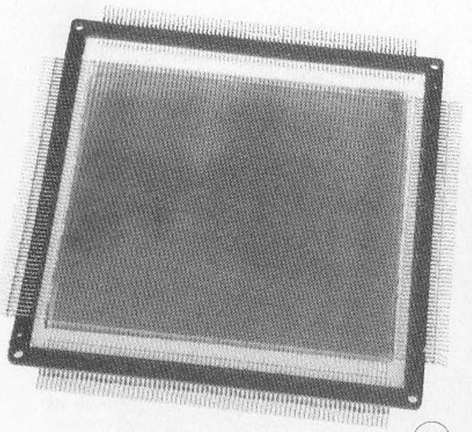
Small plastic disk mounted on metal assembly
140 x 25

This is a 'read head' used to read or record information on a disk surface. The actual magnetic reading head can be seen as a small slit in the centre of the plastic disk. The plastic disk floats on an air-cushion about 1/1000 mm above the disk surface (like a hovercraft) while the disk rotates at 220 km/hr, and is lifted off whenever the disk stops. This head has 'crashed': its air cushion failed and it ploughed into the disk surface, destroying data. Other hazards to disks are cigarette smoke particles (about 6/1000 mm), finger print grease, and hairs (about 80/1000 mm diameter).

G2 Core memory module (1968)

Roughly cubic electronic module for rack mounting, serial No. 4715
200 x 250 x 220

In the heart of this module is an assembly of magnetic core memory planes capable of storing 8192 characters of information (65536 bits). The surrounding electronics are complete and allow selection, reading and changing of a character. The module was removed from a Control Data 1700 (circa 1968) on its demise in 1978. Although this module might qualify as 'industrial art', it is strictly functional. Even the colours of the wiring assist in construction and repair. This module originally cost between $5000-$10000; equivalent storage today ranges between $3-$5.

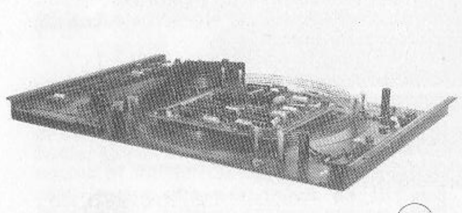


G3

G3 Memory plane

Flat matrix of wires in plastic frame
250 x 250

This is an example of the relatively rare 'magnetic rod' memory from an NCR (National Cash Register) computer. At each intersection of two wires is a minute magnetic rod which can store a single YES/NO piece of information (technically called a 'bit'). The information is stored in the UP/DOWN direction of magnetization of each rod. Such memories were competitive with the much more common 'magnetic core memories', but both are now obsolete.



G4

G4 Acoustic delay line memory (1973)

Electronics mounted on metal plate, Serial No. 023916
175 x 250

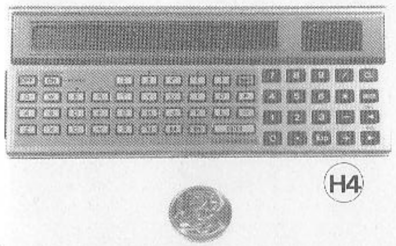
Delay line memories were common in the early days of computers. They work by sending sound pulses down a wire, which take an appreciable time to reach the far end. During that time, other pulses are following them, and are thus 'stored' in the form of sound in the wire. On arrival at the far end, the data is available for use by a computer, and either the old data or a new result are recirculated down the wire. The wire in this card from an Olivetti machine is 6m long, and sound pulses take about 1/1000 second to traverse it. The disadvantages of delay line memories are that the data is only accessible when it is being re-circulated between ends of the wire and thus the computer may be slowed down, and that when the power is removed all the information is lost.

G5

G5 Memory chips (1981)

Black plastic 'chips'

These devices contain a silicon 'chip' on which are created minute integrated circuits with up to 500,000 transistors. Surrounded by a vastly larger plastic case for ease of handling, these chips have replaced most other forms of main memory in computers. Such memories can contain up to 64,000 characters of text. The package sliced open to reveal the chip contained 16,000 characters, each accessible in 0.25 millionths of a second; its original cost is around $3.00.



H4

H1 Four Figure Tables (1954)

Blue book
140 x 220, 46pp

The 'log-book' was long used for doing approximate calculations with greater accuracy than was possible with a slide rule. Electronic calculators have rendered them totally obsolete. The book contains tables of logarithms and anti-logarithms to four decimal digit accuracy, together with various trigonometric functions. Adding logarithms of numbers is equivalent to multiplying the numbers, thus easing the problems of doing multiplications and divisions.

H2 Silicon wafer (1978)

Circular disk in plastic case
50 dia

This disk is a 'wafer' of highly purified silicon (a common element present in sand) on which have been created about 300 'integrated circuits'. The wafer is cut into dice and each die set into a plastic case to make what is commonly called a 'silicon chip'. The red ink dots on the wafer mark those circuits which have been tested and found to be faulty. It is common for there to be around 20% working circuits/wafer; minute defects in the silicon crystal or the photographic processes can cause failure.

H3 Microprocessor (1980)

Black plastic chip
50 x 15 x 4

A 'microprocessor' is a small computer on a single chip. Such computers can now be found in cars, sewing machines, telephones, ovens, and many other devices. A $10 microprocessor can outperform many early computers, including SILLIAC. The silicon chip is more complex than that of a memory and in some microprocessors contains up to 60,000 transistors. In large quantities, such computers may cost around $1 each.

H4 TRS-80 Pocket Computer (1981)

Small computer with black carry-case
70 x 180 x 15

The TRS-80 is truly a pocket-sized computer (not simply a programmable calculator). It can be programmed in a dialect of the computer language BASIC. The computer can retain 1424 steps in its memory and has a full alphabetic keyboard. The contents of the memory are retained even when the power is turned off.

H5 Nomograms (1942)

Brown book 'Reference Data for Radio Engineers'
Published by Standard Telephones & Cables Ltd
140 x 220, 60pp

A nomogram is a special purpose chart for doing a calculation, usually involving multiplication or division with logarithmic scales. These nomograms or 'abacs' calculate the electrical formulae:

$$X = 2\pi f L \quad \text{and} \quad X = 1/(2\pi f C)$$

Electronic calculators have rendered these fascinating calculating aids as obsolete as a sundial, together with slide-rules and log-tables.

H6 IBM Accounts Receivable Manual (1958)

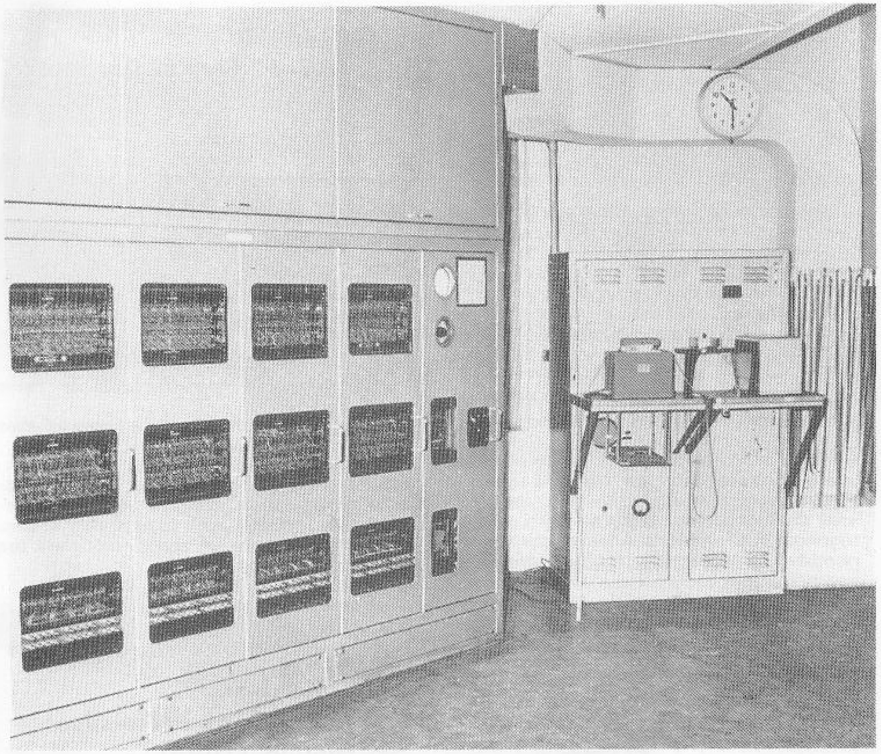
Printed manual, Form 22-6241-0
210 x 280, 48pp

This manual describes typical data processing installations oriented around handling of punched cards. Note the role of a sorting machine in the system. The manual is an excellent example of the artwork of manuals of early data processing installations.

H7 ICS Reference Library — Arithmetic (1909)

Brown hardcover book
150 x 230

This 1909 arithmetic manual illustrates how processes we take for granted, such as long division, are certainly not trivial. The book also explains how to take square roots by division-like methods, divide quantities in imperial units, and other processes which have long vanished from schools. Note the reference to a 'fast computer' midway down page 1-31 — the original meaning is a person doing computations.



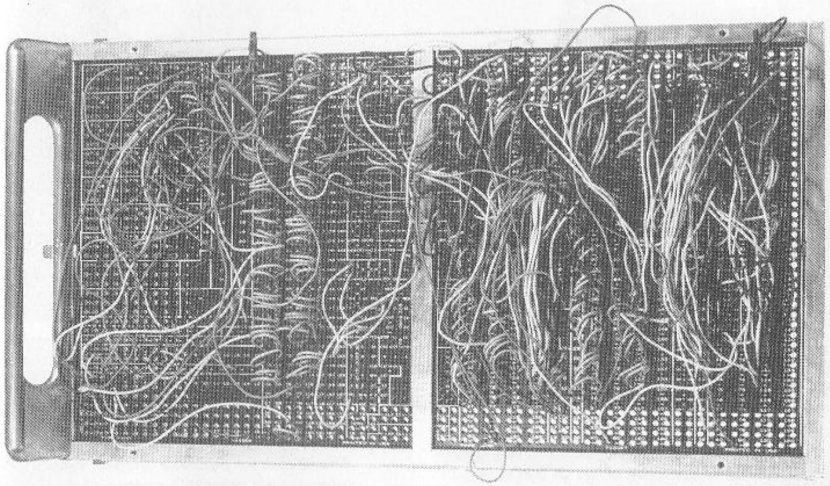
Silliac

I1 SILLIAC Programming Manual (1959)

Book, cream card cover
Published by Adolph Basser Computing Laboratory, University of Sydney
210 x 260

The SILLIAC was Australia's second working computer, and was built at Sydney University. Work on the machine was started in 1953 with funds donated to the Nuclear Research Foundation by Dr Adolph Basser CBE. It was a close copy of the University of Illinois' 1952 ILLIAC 1 computer. A portion of SILLIAC is in the Tasmanian Museum in Hobart on loan from Professor Sale's collection.

With minor alterations, the programming manual is also a copy of the ILLIAC programming manual. The machine had a total memory of 1024 numbers stored on the surface of cathode ray tubes (a 'Williams tube'), which required regeneration of the data every 1/50 second before it decayed and was lost. An addition of two numbers (of 40 bits — about 12 decimal digits) took about 75 millionths of a second. The manual further says on page 8-25 'no run of more than about 15 minutes should be made unless the calculation is checked in some way'.



(13)

I2 Elliott Algol compiler documentation

Handwritten book, grey-green card cover
240 x 350

This document is the handwritten documentation of an Algol 60 compiler for the University of Tasmania's Elliott 503 computer. Algol 60 was one of the first high-level languages, and this compiler (or translator) was one of the very first attempts to use this language. It was written by C.A.R. Hoare (later Professor of Computation at Oxford) around 1960.

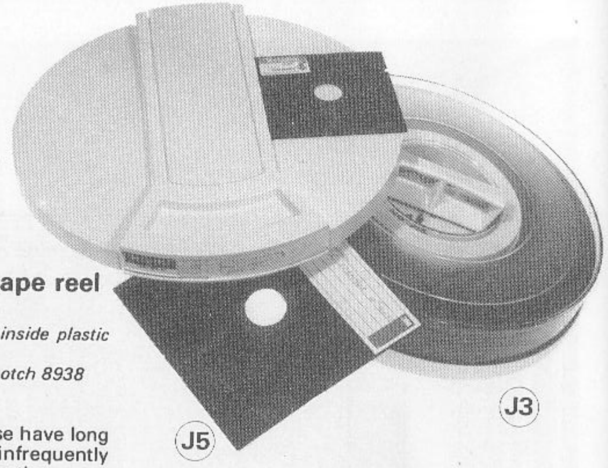
Note the very primitive form of the 'instructions'; programmers had to remember what each number meant. Each line is one 'machine word', and contains two 'instructions' separated by a 'B-line'. The cryptic handwritten comments explain the purpose of the instructions.

I3 Plugboard and program (1950)

Panel with aluminium frame and wires in sockets
Made by International Business Machines, USA
290 x 550 x 80

These plugboards were used to 'program' (give instructions to) pre-computer data-processing machines and early computers. The wiring patterns determined the machine's responses to certain data values. A data-processing centre would have a number of these panels for different applications of the machine.

The panel was slid into a slot in the machine and a lever used to force the many pins into their corresponding sockets. Re-programming was achieved by altering the wiring. This is a rare example of a computer program actually taking on a tangibly visible form.



J1 7-track magnetic tape reel (1970)

Brown tape on plastic reel, inside plastic cover
Made by Burroughs, USA; Scotch 8938 Computer tape
300 dia x 30

Magnetic tape reels such as these have long been used for the storage of infrequently required information. At one time they were the main form of storage, and the whirling 'tape drives' are familiar from numerous science-fiction films and James Bond adventures.They are still in wide use.

Typical tapes will store 7 or 9 tracks of information across the width of the tape. Density of information storage along the tape ranges from 556 'bits' per inch to 3200 bits/inch. A tape such as this might therefore hold up to 45,000,000 characters of information in its 2400 ft length.

J2 Audio cassette (1977)

Reel of brown plastic tape in plastic cassette

Cassettes are familiar in their role for recording music and speech. They are also used in some very low cost applications for storing computer information, but are generally regarded as unreliable.

J3 Removable Disk Pack (1975)

Multi-disk assembly in transparent plastic case
400 dia x 120

Removable disk packs such as this are the main storage medium in large computer installations. Information is recorded on each surface on a number of tracks around the axis. This disk pack was in use at the Transport Commission in Hobart up to 1980.

This particular disk is of an obsolete design; modern disk packs have a few more layers and higher recording densities leading to storage capacities up to 400,000,000 characters per pack. The cost of a pack is around $100. The cover protects the disk surfaces from dust; the under-cover is removed before the disk is mounted in its drive, and the top-cover is removed after it is affixed.

J4 Cartridge disk (1975)

White plastic pancake-shaped case, containing rigid magnetic-coated disk
Serial No. B1-A 11095, made by Digital Equipment Corp, USA
380 dia x 40

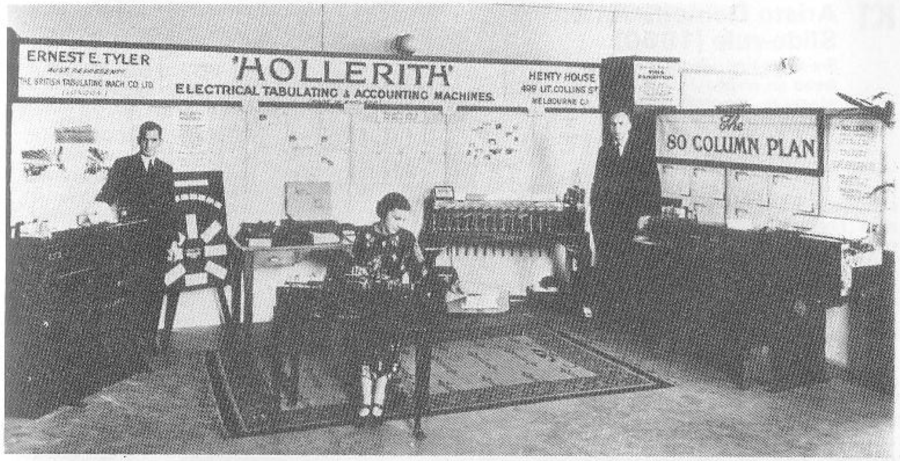
Disk cartridges such as this have been used to store information for small computers. Information is stored on 'tracks' on the magnetic-coated disk surface inside the cover.

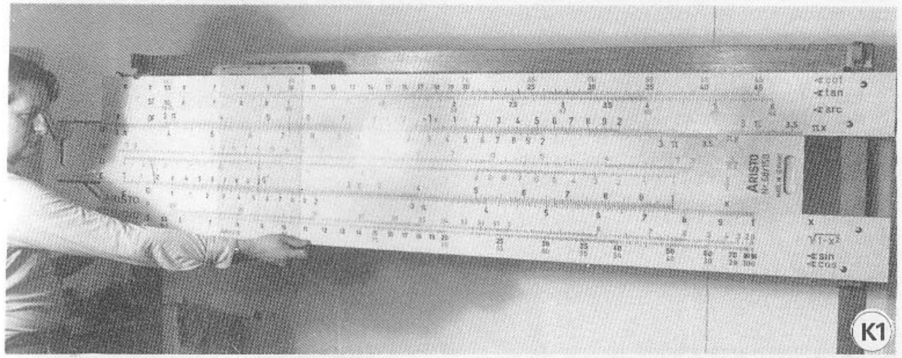
Inserting the cartridge into a disk-drive automatically pushes open a slot at the back; the cover protects the surface from dust and smoke particles which might cause errors in reading it. Such cartridges were introduced about 1963; this one was in use in 1980.

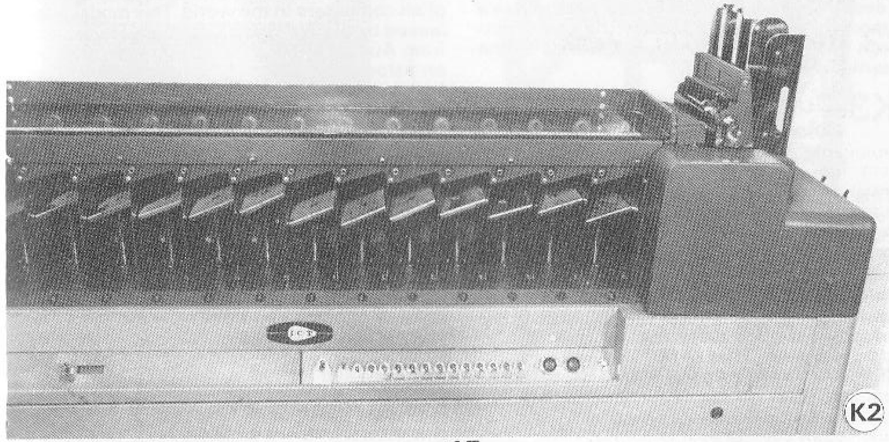
J5 Floppy disk (1980)

Flexible plastic disk inside black paper cover
140 x 140

Floppy disks are so called because they can be flexed, though this is not advised. A magnetic coated plastic disk is enclosed within a lubricated paper cover (to protect it from dust and fingerprints); information is recorded on 35 or 70 tracks around the disk, giving a storage of 150,000 to 500,000 characters per disk. Floppy disks are often called 'diskettes' if they are the 8 inch size, and 'mini-diskettes' if they are the displayed 5 inch size. These storage devices cost about $5 each, and are widely used in 'home computers', 'word processors' and small 'office computers' to store programs and data. These disks were perfected around 1978 as low-cost devices.







K1 Aristo Demonstration Slide-rule (1960)

Six-foot slide-rule for wall mounting; plastic faced on chipboard
Model No. 68/150, made by Aristo, Germany
2100 x 100 x 470

Large slide-rules such as this were mounted in the front of class-rooms in secondary schools and technical colleges as teaching aids. The teachers would demonstrate slide-rule calculations to the class. This rule was used in the Department of Physics at the University of Tasmania, and was donated in 1981.

K2 Card sorter (1950)

Large grey enamelled machine
1650 x 460 x 1250

This machine was used to 'sort' punched cards into alphabetical or numerical order, by observing the punched holes in a particular column and routing the cards into the appropriate 'pocket'. Such machines were of prime importance in the pre-computer data processing centre. Sorting is a fundamental operation, and can be used to separate creditors from debtors, to bring all a customer's transactions together, to produce lists or directories, or for census and survey work.

The handwheel to the right of the machine selects the column (of 80) that is to be observed; a wire 'brush' pressing on a brass roller observes the holes and operates a selection mechanism that routes the cards. The machine is still operational, though not fully reliable.

Compare this with the photograph of a similar machine in the 1930 Melbourne Exhibition. The sheet metal covers can be removed to reveal that they are merely disguises to give a 'modern' appearance; exactly the same cast-iron base and technology is used as in the earlier machine.

K3 Burroughs Accounting Machine

Glass-enclosed black machine on stand
500 x 500 x 1000

This adding and printing machine was used for accounting purposes in the Launceston Bank for Savings, and was donated by Burroughs in 1977. Note in particular the fine workmanship and the extreme complexity of the interior machinery. That such machines worked (let alone reliably year after year) is a tribute to their engineering.

K4 Olivetti Programma 101 (1962)

White Desk-Top Computer
450 x 600 x 200

The Olivetti Programma 101 was the first desk-top computer. This machine was imported into Australia in 1962. Of particular interest is the attention paid by Olivetti to the sculptural design of the case so that it became a piece of fine office furniture.

The P101 contains a printer, and can read programs and data from a magnetic striped card, and can write on such a card to create libraries of programs. The accuracy is up to 15 decimal places, and the number of decimal places can be set by a thumbwheel on the front. The memory could contain up to 120 program steps. This machine is still in working order.

K5 Texas Instruments SPEAK-AND-SPELL (1980)

Red plastic toy with handle and buttons
Made by Texas Instruments, Dallas, Texas
180 x 260 x 40

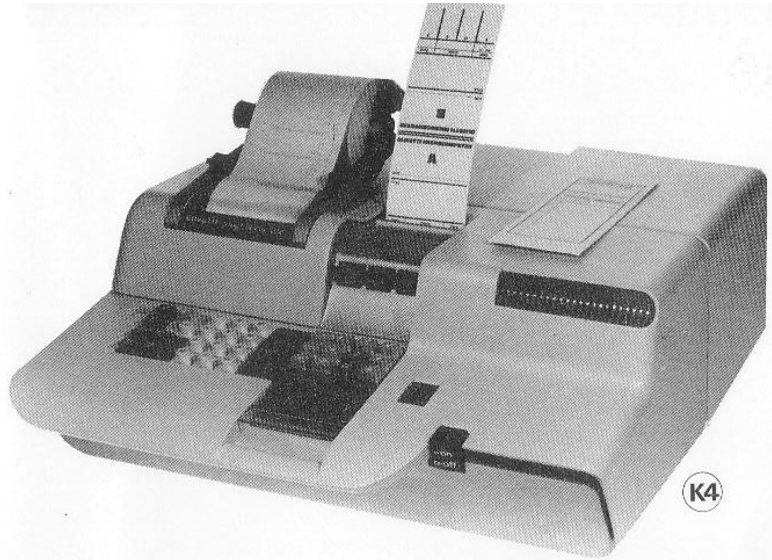
This educational aid speaks recognizable English words and sentences and can either carry out spelling drills, or a variety of guessing games designed to improve spelling ability. Costing in the vicinity of $70, and readily available in Australia, these are at the frontier of speech technology. Optional modules can be plugged in to change the spelling lists; the unit is intended as a teaching aid for teachers to use in conjunction with other techniques (chanting, repetition, etc).

K6 IBM 1440 Computer (1965)

A = Processor, B = Console, C = Disk Drive
From the collection of the Tasmanian Museum, donated by IBM Australia

The IBM 1400 series was introduced in 1959, and consolidated IBM's position as the major computer manufacturer, today supplying 60% of all computers in the world. This model was leased by the Transport Commission, Hobart, from August 1965 until 1 December 1980 — an astonishing longevity for a computer. The first production programs were operated on 14 February 1966 (Decimal Day). The machine was the last 1440 in active service in Australia (two others survive it elsewhere in the world). It was noteworthy for its extreme reliability — the memory only failed three times, and only once was it necessary to process work elsewhere (at Comalco) due to a machine failure, in its 15 year life.

On display are the central processor, the console desk from which it was controlled, and a single disk drive unit. The preservation of components of computers of this age and size requires a lot of space. For comparison, this machine contains 8000 characters of memory, whereas the new computers in the Transport Commission contain 3,000,000 characters, and are smaller.



K4

K5

K3